

On the Identity of *Pheidole vaslitii* Pergande (Hymenoptera: Formicidae), a Neglected Ant from Baja California

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Abstract.—The ant *Pheidole vaslitii* Pergande has remained a taxonomic enigma since its description over a hundred years ago from a series of workers collected in the Sierra San Lazaro, Baja California Sur, Mexico. A reexamination of the apparent type series in the USNM collection reveals that some of the specimens—including a major worker designated as “lectotype” by Creighton (1958)—are not true types and are not conspecific with *P. vaslitii*. Selection of a new lectotype of *P. vaslitii* secures its identity as a form closely related to *P. hyatti*. It differs from “typical” *P. hyatti* by the presence of more extensive sculpture on the head of the major and minor workers and by its shorter body appendages, but intermediate phenotypes occur in parts of Baja California and California. Based on current evidence *P. hyatti* is reasonably interpreted as a single, polytypic species, with both *P. vaslitii* and an infraspecific name—*P. hyatti solitanea* Wheeler, described from Point Loma, California—as newly recognized **junior synonyms**.

In 1896 Pergande described a number of new ant taxa from northwestern Mexico, based on collections made by Eisen and Vaslit during a California Academy of Sciences expedition to the region (Pergande 1896). Most of the new ants were from Tepic in the state of Nayarit, but a few species had been collected in the Cape Region of Baja California. The taxonomic status of most of these named forms has long since been resolved, but one of the species from Baja California—*Pheidole vaslitii*—has suffered an ongoing identity crisis. Despite pronouncements on *P. vaslitii* by Forel (1901), Wheeler (1914), and Creighton (1958), its taxonomic status—whether it represents a distinct species or is a junior synonym—has never been satisfactorily determined. Creighton (1958) actually complicated the situation by designating as the “lectotype” of *P. vaslitii* a major worker that was not part of the series on which Pergande’s original description was based. In preparing a checklist of the ants of Baja California (Johnson and Ward, in prep.) it became necessary to determine

the relationship of *P. vaslitii* to other named taxa, and to deal with the consequences of Creighton’s (1958) actions. It will be argued that Creighton’s lectotype designation was invalid and that it inappropriately tied the name “*Pheidole vaslitii*” to a mainland Mexican species not found in Baja California. True *P. vaslitii* appears to be a geographical variant of the widespread species *Pheidole hyatti* Emery.

MATERIALS AND METHODS

Specimens belonging to the original type series of *Pheidole vaslitii* were examined from holdings of the California Academy of Sciences, San Francisco (CASC) and the Smithsonian Institution, Washington, DC (USNM). Other relevant material in the genus *Pheidole* was studied in those two collections and in the following: Natural History Museum of Los Angeles County (LACM), California Department of Food and Agriculture, Sacramento (CDAE), Bohart Museum of Entomology, University of California at Davis (UCDC), and Robert A. Johnson collection, Tempe,

Arizona (RAJC). Other collection abbreviations cited in the text are: AMNH (American Museum of Natural History, New York), MCSN (Museo Civico di Storia Naturale, Genoa) and MCZC (Museum of Comparative Zoology, Harvard University).

All measurements were taken at 50 \times using a Wild M5A microscope and a Nikon stage micrometer, and are presented here in millimeters to two decimal places. The following measurements and indices were used:

HW	Head width: maximum width of the head, as seen in full-face (frontal) view, excluding the eyes.
HL	Head length: length of the head, measured in full-face view, from the anterior clypeal margin to the midpoint of a line drawn across the posterior margin.
EL	Eye length: length of the eye, measured with the head in full-face view.
SL	Scape length: chord length of the scape, from the base (excluding the neck) to the apex; this measurement was taken by positioning the scape so that both ends lay in the same focal plane.
BSW	Basal scape width: maximum measurable width of the basal third of the scape (measured in major workers only).
PrW	Pronotum width: maximum width of the pronotum, measured in dorsal view.
LHT	Length of the metatibia (hind tibia): length of the metatibia measured in lateral view from the distal extremity to the proximal end, excluding the medial lobe of the articulation with the femur (see Ward 1989, fig. 5).
CI	Cephalic index: HW/HL
SI	Scape index: SL/HW
REL	Relative eye length: EL/HL

REL2 Relative eye length, using HW: EL/HW

HTI Metatibial index: LHT/HW

The following index of pilosity was employed:

HTC Metatibial setal count: number of standing hairs, i.e., those forming an angle of 45 $^{\circ}$ or more with the cuticular surface (Wilson 1955), visible in outline on the outer (extensor) surface of the metatibia. This count was taken with the line of view orthogonal to the plane of tibial flexion.

TAXONOMIC HISTORY OF *PHEIDOLE VASLITII*

Pergande (1896: 883) described *Pheidole vaslitii* from specimens collected by Eisen and Vaslit in the Sierra San Lazaro, Baja California Sur, in September 1894. The original series of twenty-two specimens was said to comprise nine major workers (or "soldiers") and thirteen minor workers ("workers"). In the same paper Pergande described several other *Pheidole* taxa, including one which he thought was related to *P. vaslitii* and which he named *Pheidole obtusospinosa* (Pergande 1896: 889). This latter species was from Tepic, Nayarit, however, and the description was based on a large series ("many specimens") of major workers only. *Pheidole obtusospinosa* was synonymized with *P. vaslitii* by Forel (1901: 430). Wheeler (1914) established, however, that *P. obtusospinosa* was the same as *P. subdentata* Pergande (1896), also described from Tepic, but based on minor workers only. By this time it was also clear that, unlike most *Pheidole* species, the major workers of *P. subdentata* are quite variable in size. Wheeler treated *P. subdentata* as a subspecies of *P. vaslitii*, a situation that continued until 1958 when Creighton assigned it species rank. Until recently this species has gone by the name *P. subdentata* Pergande, with *P. obtusospinosa* as a junior synonym, but Bolton (1995) pointed out

that Pergande's *subdentata* is preoccupied (it is a secondary junior homonym of *Oecophthora subdentata* Mayr 1853). *P. obtusopinoso* is the first available replacement name for the species described from Tepic, Nayarit.

In the meantime the problem of the identity of *Pheidole vaslitii* was addressed by Creighton (1958) who examined Pergande's type series in the USNM. He concluded that type series comprised more than one species, with most of the major workers—and all of those that matched Pergande's (1896) description of the *P. vaslitii* major—being *Pheidole cockerelli* Wheeler (1908). The minor workers were said to be a mix of *Pheidole crassicornis tetra* Creighton (1950) and *P. hyatti* Emery (1895). Concerned about the replacement of *P. cockerelli* or *P. crassicornis tetra* by a more obscure senior synonym, Creighton chose as a lectotype of *P. vaslitii* a major worker that did not correspond to Pergande's (1896) original description. In fact, the identity and labeling of the specimen designated as "lectotype" indicate that it was not part of the original type series of *P. vaslitii* (see below). Moreover, Creighton (1958) admitted that he could not say what species, if any, the "lectotype" represented, i.e., he could not determine whether it belonged to any previously described species of *Pheidole*, except that it was not the species whose major worker was described by Pergande (1896) as *P. vaslitii*. This was the last action taken on *P. vaslitii* whose identity has thus remained in limbo for the last 40 years.

Other *Pheidole* names associated at various times with *P. vaslitii* are (1) *P. hirtula* Forel (1899), originally described as a variety of *P. vaslitii*, but later raised to species by Creighton (1958); (2) *P. arizonica* Santschi (1911), described as such, but treated as a variety of *P. vaslitii subdentata* by Wheeler (1914) and as a subspecies of *P. vaslitii* by Creighton (1950), before being synonymized under *P. subdentata* Pergande (Creighton 1958); and (3) *P. acolhua*

Wheeler (1914), originally described as a variety of *P. vaslitii*, but later synonymized under *P. hirtula* (Creighton 1958).

REEXAMINATION OF THE TYPE SERIES

Syntypes true and false

The solution to the *Pheidole vaslitii* problem lies in a careful analysis of the type specimens. In the USNM there are 14 specimens that appear, at first glance, to be part of the original type series. These specimens can be divided into two subsets (see also Creighton 1958: 208).

Subset A comprises 11 specimens (4 major workers, 7 minor workers) each on their own pin and bearing two sets of labels (Fig. 1): (1) Pergande's handwritten locality label "Sierra/San Lazaro/Cape region/L. Cal. Mex.", and (2) a printed label "Collection/T Pergande". Two specimens (one major and one minor worker) additionally bear a third, black-bordered label with the following notation in Pergande's hand: "Pheidole/vaslitii/n. sp./Type Perg.". On the label of the minor worker "n. sp." is placed in parentheses. As Creighton (1958) noted, the ink on the handwritten labels has faded to brown and the paper has yellowed. The major workers and most of the minor workers agree closely with Pergande's (1896) original description of *P. vaslitii*.

Subset B consists of two major workers and one minor worker whose labeling is rather different (Fig. 2). The locality labels are handwritten, evidently by Pergande, in a black ink which has not, to this day, faded, and the label paper has not yellowed in color like that of subset A. The locality for the two majors is given as "Sierra/S. Lazaro/Mex." and for the minor "Tepic/Mex.". All three specimens bear a red USNM type label as follows: "Type/No. 4488/U.S.N.M.", with the number handwritten and the remaining text printed. One of the major workers also has a third label in Pergande's writing: "Phei-



Figs. 1-2. 1, Sample of labels from specimens in "subset A" of the apparent type series of *Pheidole vaslitii*. The type label is from one of the major workers. See text for further details. 2, Sample of labels from specimens in "subset B" of the apparent type series of *P. vaslitii*. The identification label is from one of the major workers. All three specimens of "subset B" also bear a red USNM type label with the number "4488". See text for further details.

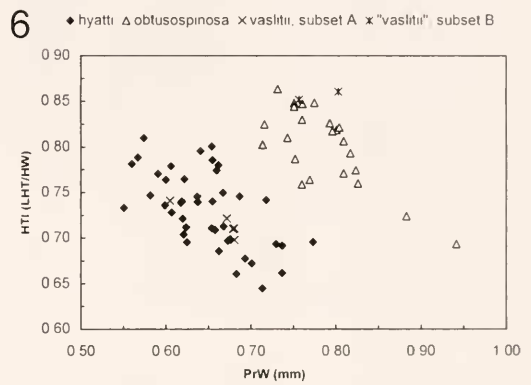
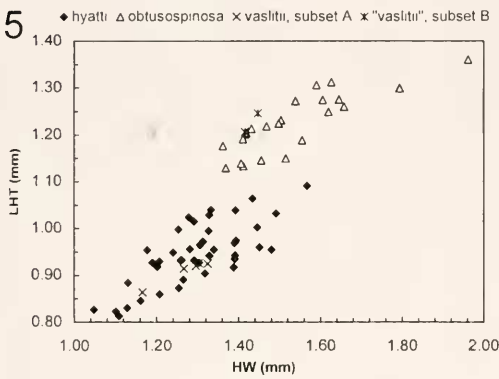
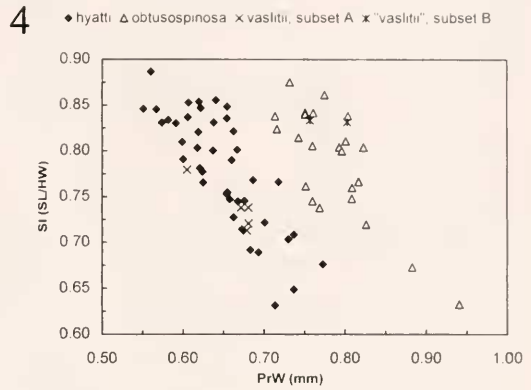
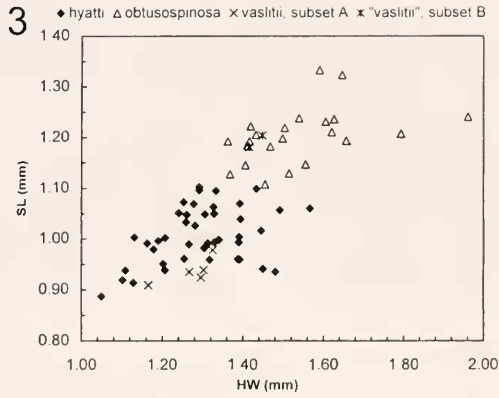
dole/*vaslitii*/Perg. Perg.". It is this specimen that Creighton (1958) designated as the lectotype of *P. vaslitii*. None of these three "type" specimens matches the original description of *P. vaslitii*.

In discussing the different appearance of the labels Creighton (1958: 209) surmised that Pergande had rewritten those of subset B when designating the specimens as types: "Dr. Smith informs me that Pergande noted in the type book of the National Museum that he had marked three specimens of *vasliti* as types. It would appear that when he did so he altered the locality labels of these three specimens, probably because he realized that the original labels were not holding up as well as might have been wished".

Creighton (1958) did not mention—and perhaps did not examine—the minor worker from Tepic, but he freely admitted that the two major workers were not part of the series on which Pergande based his description of *P. vaslitii*: "They may be medias of a polymorphic species related to

subdentata or the majors of a dimorphic one related to *hyatti*. But there is no doubt about one thing: neither of them contributed anything to Pergande's description of the major of *vasliti*" (Creighton 1958: 210). As mentioned above, Creighton's choice of a lectotype that did not correspond to the species described by Pergande was motivated by a desire to maintain nomenclatural stability: Creighton concluded that the species represented in subset A (i.e., the probable true syntypes of *P. vaslitii*) included *P. cockerelli* and *P. crassicornis tetra* and he did not want to see one of these younger (and better known) names relegated to synonymy.

Insofar as the designated specimen was not a syntype of *P. vaslitii*, Creighton's (1958) choice of lectotype is invalid (ICZN, Article 74.2). Further evidence that his "lectotype" was not part of the original type series of *P. vaslitii* comes from consideration of the identity of the three specimens in subset B (Figs. 3-6): all three are *Pheidole obtusospinosa* Pergande, a species



Figs. 3–6. Bivariate plots of various measurements and indices in major workers of *Pheidole obtusospinosa* and *P. hyatti*. Note that the *P. vaslitii* types from "subset A" fall within the values for *P. hyatti*, while those of "subset B" correspond to *P. obtusospinosa*. The plots exclude "supermajors" of *P. obtusospinosa* (HW > 2.20).

which is widespread in adjacent mainland Mexico but which is not known to occur in Baja California. In the course of studying the ant fauna of Baja California I have examined many hundreds of specimens of *Pheidole* in various collections (CASC, CDAE, LACM, RAJC, UCDC, USNM). None of the Baja specimens belonged to *P. obtusospinosa*, although I encountered examples of this distinctive species from Sonora, Sinaloa, Nayarit, Jalisco, and Arizona. In fact, the two major workers of subset B agree very closely with a series of seventeen *P. obtusospinosa* majors from Tepic, Nayarit (collected by Eisen and Vaslit), which had been placed under *P. vaslitii* in the USNM collection. Given that this arrangement of specimens was due to

Pergande, it indicates that he confused the two species.

I conclude that Pergande's marking of the three specimens in subset B as "types" of *P. vaslitii* occurred after the original description of that species, and that it involved the mislabeling of *P. obtusospinosa* specimens collected at Tepic, Nayarit. That Pergande was less than careful in these matters is indicated by the fact that in his original description of *Pheidole granulata* he cites the type locality as Tepic (Pergande 1896: 891), although the type specimens were actually from San José del Cabo, Baja California Sur (Gregg 1969: 101). Removing the *P. obtusospinosa* specimens from consideration as valid types of *P. vaslitii*, we can refocus our attention on

subset A which, it seems clear, contains the true syntypes.

A study of the USNM specimens in subset A indicates that the following two species are involved:

1. A *Pheidole* species conspecific with, or closely related to, *P. hyatti*. This is represented by four major workers and four minor workers. The majors were misidentified by Creighton (1958) as *P. cockerelli*, while he identified the minors as *P. hyatti*. In the collection of the California Academy of Sciences (CASC) there are two additional *P. vaslitii* syntypes (one major worker, one minor) that belong to this species. They both bear faded labels "Sierra/San Lazaro" and "Pergande/Type", in Pergande's handwriting.
2. A second species of *Pheidole*, related to *P. crassicornis* Emery, represented by three minor workers. These were identified by Creighton (1958) as *P. crassicornis tetra*.

Designation of a new lectotype

Given that subset A (in the USNM) and the two CASC specimens are part of the actual type series of *P. vaslitii* it is proper that the lectotype be chosen from among them. Of the two species present in the type series, only one is represented by major workers, so I have chosen as the lectotype of *P. vaslitii* one of the major workers in the USNM series. This particular specimen (with HW 1.32, HL 1.40, SL 0.98, LHT 0.92) also bears the old faded "Pheidole/vaslitii/n. sp./Type Perg." label. Formal lectotype designation is indicated below under "Taxonomic summary".

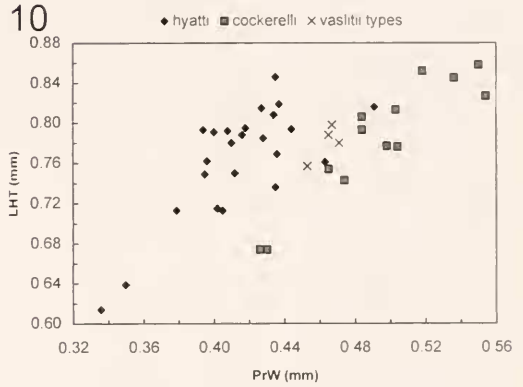
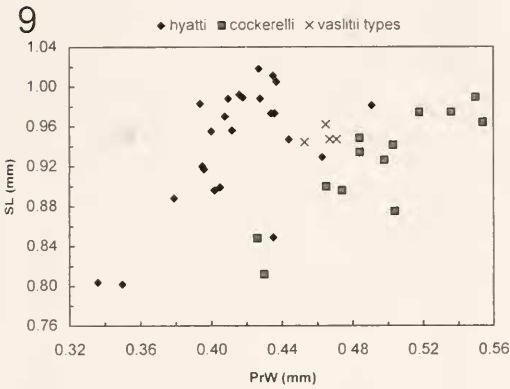
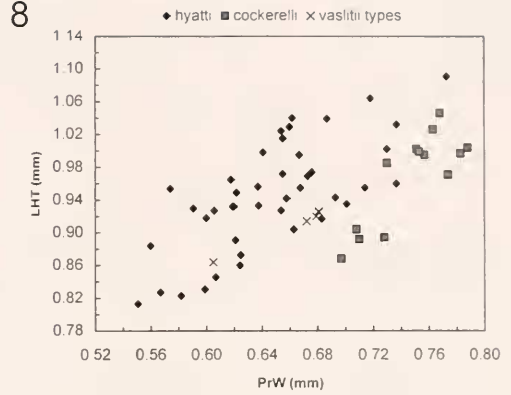
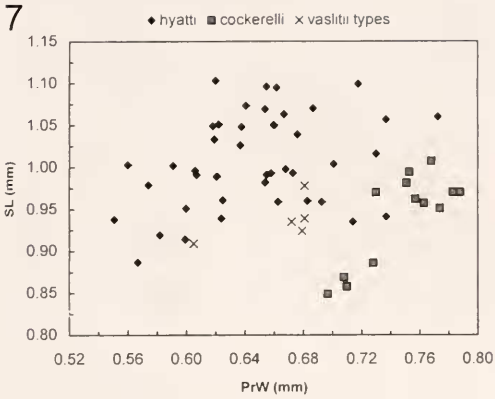
The paralectotypes in USNM and CASC are then as follows: (1) four major workers (three in USNM, one in CASC) and five minor workers (four in USNM, one in CASC) conspecific with the lectotype, and (2) three minor workers (in USNM) not conspecific with the lectotype; these are discussed further below in the section en-

titled "Identity of the second species in the type series". Specifically *excluded* from the paralectotype series are the three workers of *P. obtusospinosa* (subset B).

With this action taken, the identity of *P. vaslitii* becomes linked with the question of the magnitude and nature of geographical variation in *Pheidole hyatti*, a species widespread in the southwestern United States and northern Mexico.

Relationship of *Pheidole vaslitii* to *P. hyatti*

The major workers of *P. vaslitii* agree well with *P. hyatti* majors from other parts of Baja California and southwestern United States. They have the base of the scape strongly bent and flattened (BSW/SL 0.12–0.14); the ventrolateral hypostomal teeth are well developed and spine-like, and displaced laterally about 0.8 times the distance from the midline to the dorsolateral hypostomal teeth; the posterior margin of the head is deeply impressed medially, and this impression continues on the dorsum of the head as a narrow, transversely rugulose, median furrow which changes to a broader smooth, shiny strip above the frontal triangle; the mesonotum is angular in lateral profile; the propodeal spines are short, stout, and erect; the petiolar node is narrowly transverse; and the postpetiole is about 1.6 times broader than long, with obtuse, blunt lateral angles (as seen in dorsal view). Body sculpture is like that of *P. hyatti*, with the mesosoma largely foveolate and subopaque, the sculpture weakening medially and on the side of the pronotum; irregular transverse carinulae occur on the anterior portion of the pronotum. The head dimensions (HW 1.17–1.32, HL 1.25–1.40, CI 0.93–0.95), and relative lengths of the scapes (SL/PrW 1.36–1.50) and legs (LHT/PrW 1.35–1.43) fall within the values of *P. hyatti* and, in the case of the last two indices, largely outside those of *P. cockerelli* (see also Figs. 7–8). The body pilosity is relatively long and fine-tipped, not blunt-tipped as in *P.*



Figs. 7–10. Bivariate plots of various measurements and indices in major workers (Figs. 7–8) and minor workers (Figs. 9–10) of *Pheidole hyatti* and *P. cockerelli*. The *P. vaslitii* types (subset A) lie closer to the cloud of points representing *P. hyatti*.

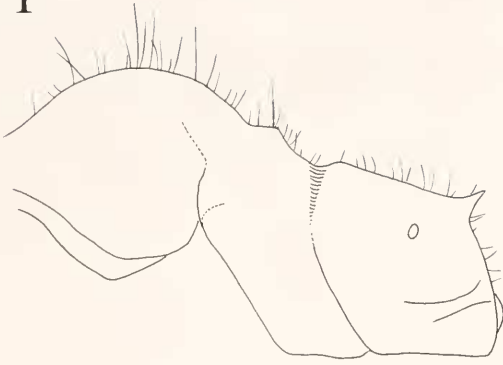
cockerelli (compare Figs. 12 and 13), and the tibiae are conspicuously hirsute (HTC 19–22, compared with HTC 1–17 in *P. cockerelli*).

It may be that Creighton (1958) mistook these *P. vaslitii* majors for *P. cockerelli* because the head sculpture is denser than is typical for *P. hyatti*. Fine reticulate-foveolate sculpture extends to the posterolateral corners of the head so that the occipital lobes (normally shiny in *P. hyatti*) are dulled. Rugoreticulum extends more than half the distance from the upper margin of the compound eye to the occipital lobes. But the rugoreticulum is not as well developed as in the majors of *P. cockerelli*, where it essentially covers the occipital lobes. Differences between *P. cockerelli* and

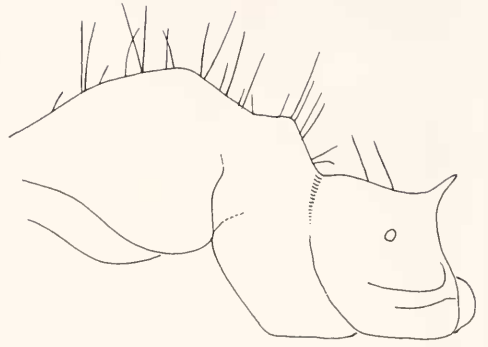
P. vaslitii in pilosity, scape length, and leg length are also evident, and with respect to these characters the *P. vaslitii* types fall within the orbit of *P. hyatti* (Figs. 7–8, 13–14, 17–18).

The conspecific minor workers (4w in USNM, 1w in CASC) agree with *P. hyatti* minors from other localities, although they tend to exhibit more extensive foveolate sculpture on the head. This character varies widely, however, and when considering *P. hyatti* minors from throughout the range of this species one finds all degrees of variation from an almost entirely smooth, shiny head (except between the compound eye and antennal insertions) to one dulled by extensive foveolate sculpture on all regions except medially. The *P.*

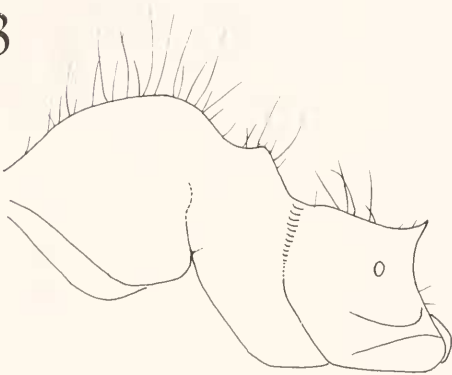
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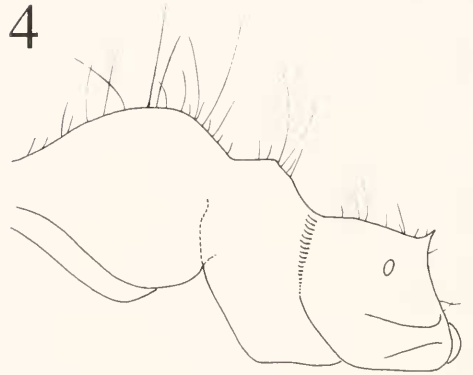
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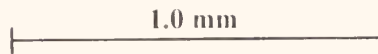
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18



Figs. 11-18. *Pheidole* major workers, lateral views of the mesosoma (11-14) and anterior views of the metatibia (15-18). Pilosity shown in outline only. 11, 15, *P. obtusospinosa* (Tepic, Nayarit); 12, 16, *P. cockerelli* (Yavapai Co., Arizona); 13, 17, *P. hyatti* (*P. vasilii* paralectotype from Sierra San Lazaro, BCS); 14, 18, *P. hyatti* (Riverside Co., California).

vaslitii workers lack the weak rugoreticulum that typically occurs on the posterior portions of the head in minors of *P. cockerelli*. The pilosity on these *P. vaslitii* minor workers is also more slender and flexuous than that of *P. cockerelli*. The tibial pilosity is conspicuous (HTC 14–19), like that of *P. hyatti*. Measurements and indices are well within the limits of *P. hyatti*: HW 0.63–0.66, CI 0.82–0.84, SI 1.44–1.49, SL/PrW 2.01–2.08, REL 0.23–0.24, HTI 1.19–1.22, LHT 0.76–0.80, LHT/PrW 1.66–1.72 ($n = 4$ for the first six sets of values, because one of the USNM specimens is headless) (see also Figs. 9–10).

Thus, *Pheidole vaslitii* falls within the range of variability that occurs in the widespread species, *P. hyatti*. In addition to denser head sculpture, the *P. vaslitii* types also tend to have shorter scapes and legs than *P. hyatti* from other regions (Figs. 3–10). The differences are not diagnostic, however, and individuals intermediate in morphology between *P. vaslitii* and more “typical” *P. hyatti* occur widely, especially on the Baja California peninsula and in California. It is possible that there is more than one biological species in this complex, but I can find no consistent phenotypic discontinuities that would justify recognition of more than one taxon. Without a more detailed (preferably genetic) analysis of the situation, it seems advisable to treat *P. hyatti* as a single polytypic species, with *P. vaslitii* as its junior synonym. This is formally indicated below (under “Taxonomic summary”), along with the overdue synonymy of *P. hyatti solitanea* Wheeler under *P. hyatti*.

While it may be coincidental, it seems worth noting that other *Pheidole* species in Baja California show some evidence of north-south clines in the intensity of head sculpture. This is seen most strikingly in *Pheidole yaqui* Creighton and Gregg: populations of this species from California and northern Baja California have the posterior portion of the head of the major worker largely smooth and shining, while

populations from farther south on the peninsula show increasing development of transverse rugulation on the posterior margin of the head (Ward, pers. obs.).

Identity of the second species in the type series

Three minor workers from the syntype series of *P. vaslitii* belong to a distinctly different species. The head is broader (HW 0.66–0.68, CI 0.88–0.90), and the scapes and legs are shorter (SI 1.18–1.21, HTI 1.00–1.02). The head is sublucid, with weak reticulate-foveolate sculpture overlain by irregular longitudinal carinulae; the sculpture is less developed medially where there are more extensive shiny interspaces. The standing pilosity is short, sparse and blunt, with about 7–9 standing hairs visible in profile on the mesosoma dorsum, and none on the extensor surface of the tibiae.

Creighton (1958) identified these workers as *Pheidole crassicornis tetra* Creighton. He actually cited the author as W. M. Wheeler (1908), but the name *tetra* did not become available until 1950 when Creighton raised Wheeler’s infrasubspecific name to subspecies rank (Bolton 1995). In the literature *tetra* has continued to be treated as a subspecies of *P. crassicornis*. Naves (1985) opined that it was a distinct species, similar to *P. diversipilosa* Wheeler (1908), whereas Creighton (1950) emphasized the existence of intermediates and considered all three names to refer to a single species.

The three minor workers from Baja California evidently belong to what could be called the *P. crassicornis* complex. In comparison with minor workers from Arizona and Texas, provisionally identified as *P. diversipilosa* and *P. crassicornis tetra* respectively, the Baja minors agree closely in overall habitus, pilosity and body measurements, but differ by having more conspicuous longitudinal carinulae on the head, greater encroachment of reticulate-foveolate sculpture on the center of the

pronotum, and slightly longer legs (LHT 0.66–0.70, HTI 1.00–1.02; compared with LHT 0.53–0.62 and HTI 0.89–0.97 in the Arizona and Texas material). With respect to pilosity they are most similar to the Arizona specimens, both having slightly shorter hairs than the Texas workers. In the Baja workers the length of the longest seta on the petiole is 0.090–0.104 mm, on the postpetiole 0.094–0.105 mm, and on abdominal tergite IV 0.081–0.096 mm. In the absence of any associated major workers—and given continued uncertainty about the relationship of *crassicornis*, *tetra* and *diversipilosa* to one another—it does not seem feasible to identify the minor workers any further at this time.

TAXONOMIC SUMMARY

Pheidole hyatti Emery 1895

(Figs. 13, 14, 17, 18)

Pheidole hyatti Emery 1895. Syntype workers (majors, minors), San Jacinto, California (E. Hyatt) (AMNH, MCSN).

Pheidole vaslitii Pergande 1896. Syntype workers, Sierra San Lazaro, Baja California Sur, Mexico (Eisen & Vaslit) (CASC: 1 major worker, 1 minor worker; USNM: 4 major workers, 4 minor workers); one major worker in USNM here designated **lectotype** to clarify application of the name *P. vaslilli* (see previous discussion on page 90). **Syn. nov.**

Pheidole hyatti var. *ecitonodora* Wheeler 1908. Syntype workers (majors, minors), Texas, New Mexico, Colorado (AMNH, LACM, MCZC). Synonymy by Creighton (1950: 180).

Pheidole hyatti subsp. *solitanea* Wheeler 1915. Syntype workers (majors, minors), queens, Point Loma, San Diego, California (W. M. Wheeler; P. Leonard) (AMNH, MCZC). **Syn. nov.** Synonymy previously listed in a report by Snelling and George (1979: 104), not considered a formal publication by Bolton (1995).

P. cockerelli; Creighton (1958), misidentification of *P. vaslitii* syntypes (part)

Diagnosis, major worker.—Medium-sized (HW 1.05–1.57; HL 1.14–1.63, LHT 0.81–1.09; n = 47); scape conspicuously flattened and bent basally (BSW/SL 0.09–0.15), of

moderate length (SI 0.63–0.89, SL/PrW 1.28–1.79), not exceeding the posterior margin of the head when laid back against the head; ventral hypostomal teeth well-developed, spine-like, much closer to the dorsolateral hypostomal teeth than to the midline; posterior margin of head with deep median impression; eyes of moderate size, REL 0.15–0.19; pronotal humeri not prominent; mesonotum distinctly angular in profile; propodeal spines short, stout and directed posterodorsally; postpetiole with blunt, obtuse lateral angles (dorsal view); legs relatively long, HTI 0.64–0.81, LHT/PrW 1.30–1.66. Anterolateral regions of head with rugoreticulate and reticulate-foveolate sculpture which variably invades the medial and posterior portions of head (a smooth, shiny area generally persists in the medial impression above the frontal triangle); posterior margin of head finely sculptured or smooth, lacking conspicuous rugoreticulum; mesosoma mostly foveolate and (sub)opaque, becoming sublucid on the side of the pronotum and on the pronotal dorsum, where there are usually transverse carinulae. Body pilosity abundant, long, slender, fine-tipped; conspicuous on the tibiae (HTC 15–27). Color variable, from light orange-brown to dark reddish-brown, gaster often darker than the rest of body.

Comments.—*P. hyatti* is found from Texas, Oklahoma and Colorado west to Nevada and California and south into northern Mexico (Kempf 1972; Smith 1979). As befits its wide distribution, the species occupies a broad range of habitats including Chihuahuan, Sonoran and Great Basin deserts, short-grass prairie, pinyon-juniper woodland, oak woodland, riparian woodland, chaparral, and coastal sage scrub (Droual 1983; Gregg 1963; Snelling and George 1979; Suarez *et al.* 1998; Wheeler and Wheeler 1973, 1986). With respect to foraging behavior, *P. hyatti* appears to be a generalist omnivore rather than a seed-harvesting specialist (Wheeler 1908; Snelling and George 1979). Colonies of *P. hyatti* are

frequently subject to raids of the army ant, *Neivamyrmex nigrescens* (Droual and Topoff 1981; Mirenda *et al.* 1980; Ward 1999).

***Pheidole obtusospinosa* Pergande 1896**
(Figs. 11, 15)

Pheidole obtusospinosa Pergande 1896. Syntype workers (majors), Tepic, Nayarit (Eisen & Vaslit) (LACM, USNM).

Pheidole subdentata Pergande 1896. Syntype workers (minors), Tepic, Nayarit (Eisen & Vaslit) (LACM, USNM). Note: Wheeler (1914) synonymized *P. obtusospinosa* under *P. subdentata*, but Pergande's *P. subdentata* is preoccupied (Bolton 1995), so *P. obtusospinosa* is the first available replacement name.

Pheidole vaslitii; Creighton (1958), misidentification and invalid "lectotype" designation.

Diagnosis, major worker.—Large species, variable in size (HW 1.36–2.90, HL 1.39–2.55, LHT 1.13–1.50; $n = 28$); in medium-sized workers (HW < 2.20) scape relatively long (SI 0.63–0.88, SL/PrW 1.32–1.66) and bent basally but usually not conspicuously broadened (BSW/SL 0.07–0.10); in supermajors (HW > 2.20) scape relatively short (SI 0.44–0.48, SL/PrW 1.00–1.13) and basal portion notably broadened (BSW/SL ~ 0.14); ventral hypostomal teeth present, generally spine-like, much closer to the dorsolateral hypostomal teeth than to the midline; posterior margin of head with shallow, obtuse V-shaped impression, becoming more deeply notched in supermajors (HW > 2.20); eyes relatively small, REL 0.11–0.16; pronotal humeri not strongly protuberant; mesonotum bluntly angular in profile; propodeal spines short, stout and directed posterodorsally; postpetiole with blunt, obtuse lateral angles (dorsal view), more prominent in supermajors; legs long, HTI 0.52–0.86, LHT/PrW 1.19–1.62 (in all but supermajors HTI 0.69–0.86, LHT/PrW 1.45–1.62). Upper surface of mandibles smooth and shiny, except for weak basal striae. Dorsum of head largely covered with rugoreticulate and reticulate-foveolate sculpture, densest (and the longitudinal orientation of the ru-

gulae least evident) in supermajors; mesosoma mostly foveolate and (sub)opaque, becoming sublucid on the side of the pronotum and on the pronotal dorsum, where there are transverse carinulae. Body pilosity very abundant, shorter and more blunt-tipped than in *P. hyatti*, conspicuous on the tibiae (HTC 25–36). Color varying from orange-brown to dark reddish-brown, the gaster sometimes darker than the rest of the body.

Comments.—*P. obtusospinosa* is known from Arizona, Sonora, Sinaloa, Nayarit and Jalisco. Creighton (1958) recorded the species, under the name *P. subdentata*, from "elevations up to 6300 feet in many of the mountains of southern Arizona" and noted that "while the number of *subdentata* nests in an area is often quite large, this species never seems to exclude other ants from such areas". In Arizona I have encountered *P. obtusospinosa* in oak-pine-juniper woodland and oak-juniper woodland, at elevations ranging from 1670m to 2100m. Colonies were found nesting under stones, and workers (including soldiers) foraged nocturnally on the ground, and came to tuna fish baits. Groups of minor and major workers were also seen, without brood, under a rotting log and in a dead branch of *Quercus grisea*. There are recent records of *P. obtusospinosa* workers (mostly minors) visiting extrafloral nectaries of *Ferocactus*, *Opuntia* and *Pachycereus* at several sites near Punta Chueca, Sonora (leg. Kevin Walker).

***Pheidole* sp. (*crassicornis* complex)**

Pheidole vaslitii Pergande 1896 (part); 3 minor workers, Sierra San Lazaro, Baja California Sur, Mexico (Eisen & Vaslit) (USNM); not conspecific with the above newly-designated lectotype of *P. vaslitii*.

Pheidole crassicornis tetra; Creighton (1958).

Comments.—The identity of the three minor workers is discussed above. Based on material from southern United States the major workers of this complex may be recognized by the following features (1)

ventrolateral hypostomal teeth well developed, spine-like, displaced laterally about 0.75 times the distance from the midline to the dorsolateral teeth, (2) base of scape flattened and broadened (BSW/SL ~ 0.14), (3) scapes very short, SI < 0.60, SL/

PrW < 1.16, (4) legs very short, HTI < 0.62, LHT/PrW < 1.18, (5) standing pilosity blunt-tipped, sparse on appendages, HTC < 10, (6) posterior third of head largely smooth and shining, lacking reticulate-foveolate sculpture.

KEY TO SPECIES ASSOCIATED WITH THE NAME "*PHEIDOLE VASLITII*"

The following key is not intended to be comprehensive. It is concerned only with those *Pheidole* species that have been confused with *Pheidole vaslitii*, and is presented as a summary of the differences between them. Most of these species belong to the *P. fallax* group, as defined by E. O. Wilson in his forthcoming monograph on the New World *Pheidole* (Wilson, in prep.). Wilson recognizes a separate *P. crassicornis* group that seems likely to be nested phylogenetically within the *P. fallax* group, insofar as it possesses the basic features of the latter group but manifested as more derived states. The term "*P. crassicornis* complex", as used below, refers to three taxa in the *P. crassicornis* group (*P. crassicornis*, *P. crassicornis tetra*, and *P. diversipilosa*) whose relationships to one another need further clarification.

Pheidole obtusospinosa and *P. hirtula* are very closely related. The distinctions cited in the key to majors are taken from Creighton (1958), and are admittedly slight. Future study may well show that these two taxa are simply geographical variants of a single species. I have been unable to find diagnostic differences between the minor workers of *P. obtusospinosa* and *P. hirtula*.

Major workers

- 1 Legs relatively long, LHT 1.11–1.50, and eyes small (EL/LHT 0.16–0.21); major workers variable in size (HW 1.31–3.07), and "supermajors" (HW > 2.20) occur; body pilosity conspicuous, relatively short and dense (Figs. 11, 15), HTC 25–48 2
- 1' Legs shorter, LHT < 1.10, and eyes relatively large (EL/LHT 0.22–0.29); major workers less variable in size (HW 1.05–1.57), supermajors lacking; body pilosity variable (Figs. 12–14, 16–18), generally less abundant, HTC 0–27 3
- 2 In largest individuals (HW > 2.50) head strongly cordate, conspicuously narrowed towards the mandibular insertions (Creighton 1958, fig. 1); rugulate sculpture tending to be less developed on posterior half of head, which may be subclucid (northeastern Mexico, west to Chihuahua, Durango and Jalisco) *hirtula* Forel
- 2' In largest individuals (HW > 2.50), head less strongly cordate, less strikingly narrowed anteriorly (Creighton 1958, fig. 2); posterior half of head with rugulate and reticulate-foveolate sculpture tending to be more strongly developed (Arizona, Sonora, Sinaloa, Nayarit, Jalisco) *obtusospinosa* Pergande
- 3 Scapes and legs very short, SL/PrW < 1.16, LHT/PrW < 1.18; standing pilosity sparse, HTC < 10 (southern United States, northern Mexico) *crassicornis* complex
- 3' Scapes and legs longer, SL/PrW 1.21–1.79, LHT/PrW 1.23–1.66; pilosity variable 4
- 4 Pilosity long, fine-tipped, and abundant (Figs. 13–14, 17–18), HTC 15–27; occipital lobes varying from smooth and shiny to reticulate-foveolate and opaque, but lacking conspicuous rugoreticulum; scapes and legs longer, SL/PrW 1.28–1.79, LHT/PrW 1.30–1.66 (n = 47) (see also Figs. 7–8), (southwestern United States, northern Mexico) *hyatti* Emery
- 4' Pilosity shorter, blunt-tipped and less dense (Figs. 12, 16), HTC 1–17; occipital lobes rugoreticulate and subopaque; appendages shorter, on average; SL/PrW 1.21–1.33, LHT/

PrW 1.23–1.36 (n = 13) (see also Figs. 7–8) (southwestern United States, northern Mexico)
 *cockerelli* Wheeler

Minor workers

- 1 Legs long, LHT 0.85–0.95, and eyes small (EL/LHT 0.19–0.23); body pilosity abundant and moderately long, HTC 14–28 *hirtula* Forel and *obtusospinosa* Pergande
- 1' Legs shorter, LHT 0.52–0.85, and eyes relatively large (EL/LHT 0.22–0.29); body pilosity variable, often less abundant, HTC 0–24 3
- 2 Scapes and legs very short, SI 1.11–1.22, HTI 0.89–1.02 (n = 11); eyes smaller, REL2 0.23–0.27; pilosity sparse and short, HTC 0–7 *crassicornis* complex
- 2' Scapes and legs longer, SI 1.24–1.71, HTI 1.07–1.38 (n = 41); eyes larger, REL2 0.27–0.34; pilosity longer and more abundant, HTC 7–24 3
- 3 Pilosity on body and appendages long, fine-tipped, and abundant, HTC 11–24; upper third of head smooth and shiny or partially invaded by foveolate sculpture and subopaque, but lacking rugulae; head more elongate (CI 0.77–0.85), scapes and legs longer, SL/PrW 1.95–2.50, LHT/PrW 1.64–2.01 (n = 28) *hyatti* Emery
- 3' Pilosity less common, blunt-tipped, HTC 7–18; upper third of head largely opaque, covered with foveolate sculpture and overlain by weak rugoreticulum or longitudinal rugulation; head broader (CI 0.82–0.90) and appendages shorter, on average, SL/PrW 1.74–1.99, LHT/PrW 1.49–1.67 (n = 13) *cockerelli* Wheeler

CONCLUDING REMARKS

The “*Pheidole vaslitii* problem” exemplifies two difficulties that have often arisen in ant taxonomy: insufficient access to, or analysis of, type specimens on the one hand, and yet (paradoxically) a subtle typological bias on the other hand, which has sometimes led investigators to overrate the significance of differences among populations of the same species. It is ironical that Creighton’s (1958) dubious choice for the lectotype of *P. vaslitii* would not have occurred if he had recognized the major workers in the type series as variants of the older-named *Pheidole hyatti*, in which the “typically” smooth shiny occipital lobes had become clouded by sculpture. To be fair, it could be argued that Creighton did not possess a sufficiently large and geographically extensive series of specimens of *P. hyatti*, especially from Baja California. From the vantage point of the more extensive data now available *Pheidole hyatti* appears to be a classic example of a polytypic species (Mayr 1982),

i.e., one that consists of a series of geographically dispersed and morphologically disparate populations, linked together by intermediate populations and showing evidence of recent or ongoing gene flow. At the same time, the possibility cannot be excluded that one or more cryptic species lurks within this complex of populations, especially in view of the broad range of habitats occupied.

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